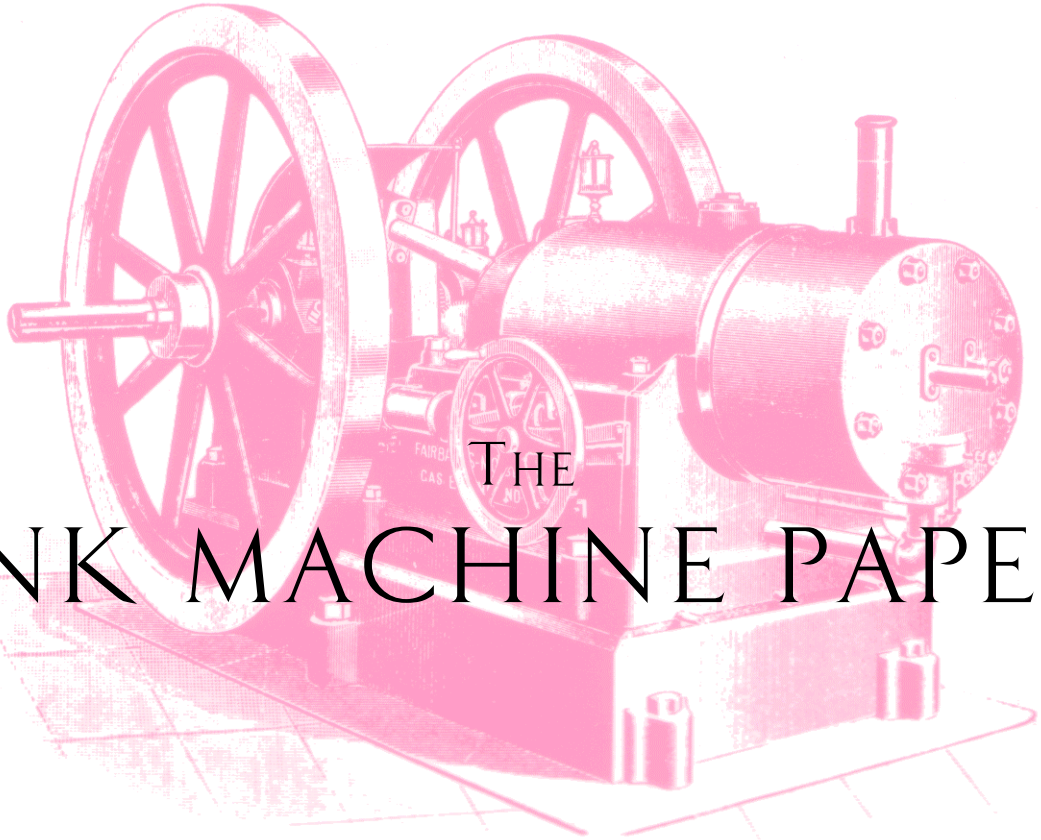

The PINK MACHINE PAPERS

#6 - nr. 6 / 2001

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The Pink Machine Papers
ISSN 1650 - 4062
Stockholm, 2001

Spacing, Timing and Efficiency

Paper for the Timing & Spacing Conference in Palermo, November 2001

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Introduction

> "Telecom firm Song Networks Holding AB, former Tele 1 Europe, will dismiss 100 employees in the Swedish subsidiary in order to increase efficiency and lower costs." TT Nyhetsbanken, 20010827.

The title of this conference is 'Timing and Spacing' and it "aims to examine them [time and space] as achievements which require many practical tools, technologies and practices to exist and be sustained [in organisations]". We seem to somehow be interested in the design, construction and maintenance of time and space "necessary for 'achieving' organisations". In other words, it might not be totally incorrect to say that the conference is partly about the engineering of time and space in organisations. Engineering as in "design, construction and maintenance" but mostly in 'design', since there can be spontaneous construction of times and unconscious maintenance of spaces (as surely some papers in this conference will show). It is in the intentional and structural approach to designing times and spaces that we think one can find the ideals of engineering.

The authors are particularly interested in the familiar adjective 'efficient' and how it so often appears associated with the designing of times and spaces. Most of the times one finds the word 'efficiency' in the management discourse it is involved the following equation:

efficiency + organisation = increase in profit

It is not difficult to present one explanation of why 'efficiency' has obtained such a prominent place in the management culture: efficiency is directly related to reduction of costs and thus to the increase in profit. This is a rational, if simplistic, reason to consider efficiency in the firm as something positive. But we do not think that this simple account ex-plains the massive use of 'efficiency' in press releases, analysis of companies and management books; we think that the term 'efficiency' has become an aesthetic ideal, a concept that is valuable in itself. Once an argument reaches the idea of 'efficiency' it is not necessary to move beyond, the concept can be used as a legitimising principle.

Now, is this claim provable? Can we demonstrate that the concept of efficiency has become an aesthetic ideal? Answering this question is a matter of the philosophy of science, something which this paper is not about. Rather simplistically we could say whether it is provable or not is not relevant to our aims: We do not want to verify 'objectively' that efficiency is an aesthetic ideal[1] but instead consider the possibility and see if it gives us some new understanding of the organisational discourse. Those who have read Johan Asplund's *Om undran inför samhället* will probably recognise some of his ideas in this sort of approach.

There is, on the other hand, a more relevant objection to be made: Has efficiency become an aesthetic or a moral ideal? Can we not say that the use of the word 'efficiency' can better be understood as a moral rather than an aesthetic issue? Well, moral and aesthetic issues are particularly difficult to tell apart and if Kant needed two books to put some order in those concepts, we will not be able to do so in one paper. Nevertheless, there are clear moral aspects to the word efficiency, and this is something that Weber has not missed: consider the title of one of his main works: *The Protestant Ethics and the Spirit of Capitalism*. And the text by Benjamin Franklin that he chooses to clarify what he means by 'the Spirit of Capitalism' leaves little room for doubt, this is how it starts:

> Think that time is money. He who can earn ten shillings a day with his work and dedicates half the day to walk leisurely, or to loaf in his room, even if he only spends six pennies for his amusement, he must not only count this, in reality he has spent, or rather squandered, five shillings more. (our own translation back from Spanish) (Weber 94, §42).

Fredrick W. Taylor had also clear ideas of what Scientific Management was and why it was 'good' for his country. For Taylor efficiency was directly connected with order, control and optimisation; all of them ideals that are still valid today. Now, it would have been interesting to ask him whether he considered a clearly organised company more beautiful than a chaotic one. Personally, I believe that he would answer affirmatively, he would say that an ordered organisation is more pleasurable to see than a disorganised one. Science Fiction and time travelling aside, our point is that it is difficult to make a clear distinction between the moral and the aesthetic sides of 'efficiency'. Did he consider 'efficient' organisations to be good or to be elegant? He probably thought they were both.

So, back to our initial question: Can we better understand the use of 'efficient' as a moral or as an aesthetic question? Both are important and someone should study 'efficiency' from a moral point of view, we will take the aesthetic aspects.

Still, a thorough study of the aesthetic aspects of 'efficiency' in the world of management is beyond the scope of this paper, we just want to open one door: the comparison with the concept of 'efficiency' in engineering. This idea is problematic in that it might prove difficult to reach any agreement as what 'efficiency' means in the engineering world and whether there is such a thing as a homogeneous group that could be called 'the engineering world'. But we do not intend to actually prove anything, this is just an exploratory paper which we hope can help the reader and ourselves gain new insights in the use of the word 'efficiency'.

[1] whatever that might mean

> In private finance initiatives for hospitals and prisons the private sector enjoys three potential advantages. First, it has greater flexibility to cut running costs by increasing capital spending. Second, it may loosen the grip that organised labour sometimes gains over state monopolies. Third, the pursuit of profits may make private companies more efficient. (Financial Times. Editorial comment: Tube costs. Published: August 27 2001)

Efficiency in Engineering

> ...those that I feel are skilful engineers [...] are those that can get all this together, those that understand the relationships and can see the geometry and the structures, those that understand that 'this is going to be an efficient and strong structure; while others cannot see that at all. (professor at the Royal Institute of Technology, Stockholm, own material, 2001)

The concept of 'efficiency' is not fixed for all engineers in all situations. More often than not, it is unclear how measure the efficiency of a given system. Take for instance a computer network, how is one to quantify its efficiency? Should one take the ecological implications in consideration? And how should that be measured? What about the ease of use and the ergonomic qualities? What makes a system more efficient? These difficulties make it impossible to talk about a universal idea of the 'efficiency' of a system.

Nevertheless, there is one idea of the concept of 'efficiency' that is common to all engineers: that of the ratio between output power and input power (or energy). The original concept of efficiency in physics is based on the transformation of one type of energy into another. Engineers and inventors have come up with quite a few different sorts of transformations, from windmills (wind into movement) to batteries (chemical into electrical) and dynamos (kinetic into electrical). A system is efficient if most of the first energy is transformed into the second, and there is indeed a mathematical description of efficiency:

e=P2/P1, where P2 is the desired form of energy (second) and P1 the available one (first)

This sort of definition works on the paper and in the exams at the engineering schools but becomes, as we explained above, a question of interpretation once we are faced with a real-world case. How should we measure the first and second energy? Does human effort count as energy? And what about maintenance work? Still, the concept of efficiency is always related to the ratio between what the system provides and what it needs in order to function, however one might choose to include in those two terms.

A 100% efficient system would be one in which all the first energy (or what the system needs in order to function) is transformed. But this perfect system does not exist: there is always some energy loss in the transformation. Two things make a system *not* work efficiently: one, a bad design, that is, wrong dimensions, wrong material, wrong power transmission, whatever; and two, friction, that is, parts that rub against each other and produce heat instead of the desired effect.

We have just called a 100% efficient system a *perfect* system. This is not an accident: as much as it is difficult to agree on how to measure the efficiency of a system, there is no question amongst engineers that the more efficient it is, the better. This 'better' relates to both a practical (economical) better and to an aesthetic better[2]. These two aspects of the search for efficiency are important in the work of engineers.

Instrumental Aspect

The first aspect is related to the fact that systems are not constructed for the pleasure of constructing them, they are designed in order to solve a problem or to obtain a given effect. This is the instrumental aspect of systems design: the system per se has no value, it is what one can do with it that is of interest. In other words, the system is only interesting as a tool (instrument). Since it is of no value other than for what it can produce, it results that it should be as efficient as possible: there is no point in wasting power for anything else than for what it has been designed. This is, we would like to remind the reader, only an ideal thought, something that cannot be finally contrasted since, for most systems, it is not possible to resolve the interpretation problem of what should be considered output, input and waste. But, despite this practical obstacle, a system is always designed to be efficient, according to whichever way this 'efficiency' is defined.

Aesthetic Aspect

Efficiency has, besides this instrumental aspect (which can never be finally contrasted), also an aesthetic aspect: engineers want to design efficient machines. They want to design systems of which they can feel proud and 'efficient' is one of the characteristics an elegant solution should include:

> ... Antoine de Saint-Exupéry, the French writer and aircraft designer, said that "A designer knows he has arrived at perfection not when there is no longer anything to add but when there is no longer anything to take away". More programmers should judge their work by this criterion. Simple programs are usually more reliable, secure, robust and efficient than their complex cousins, and easier to build and to maintain. (Bentley, Jon)

In this case, it doesn't matter that the concept of efficiency cannot possibly be measured because this is a purely aesthetic issue. It goes together with other qualities, such as simple, neat, elegant, etc. There are no clear distinctions between them and it makes no sense to claim that a design would be 'neat but not elegant' or anything of the sort. So, even if it is impossible to define what a simple program is, even less so how one would measure simplicity, engineers *know* when a design is simple. The same goes for all the others, including efficiency: it is not longer a matter of

[2] Does this 'better' also have a moral aspect? Difficult question, but in our interviews with professors at the Royal Institute of Technology and through our own experience (we are both engineers) the moral issues have seldom, if ever, appeared. It seems that the engineers focus more on the technical aspects of their work than on the ideals of making the world a better place (that characterise Modernism). Whether this is a result of a 'post-modern condition' or of something else is not something we would like to pronounce ourselves about.

measuring but a matter of what the design looks like (or feels like). It has not escaped Gideon Kunda that these are values which are rooted beyond a rational pragmatism:

> Technology and its aesthetics are said to be the main concern of engineers, who are driven by a fascination with 'neat things' or 'bells and whistles' - challenging features to design, interesting problems, and sophisticated, state-of-the-art technology. [...]. If these qualities are not available in regular work and assigned projects, they can be sought in 'midnight projects' - the illicit projects that dedicated engineers are said to take on in their free time for the sheer interest or pleasure of the work. (Kunda 1992, §39)

The concept of efficiency is thus present in two different discourses but it is always used to denote positive aspects. 'Inefficient' is, on the contrary, always negative: both from the economic perspective and from the aesthetic one.

It is also worth noting that 'efficiency' is an adjective that pertains to the discourse of practical activities, it is, for instance, not used in the realm of science. What would an 'effective scientific law' mean? Nothing, really. The scientific discourse is concerned with the validity of statements, not with their efficiency. There can be an efficient way of running a scientific research project, but this 'efficient' deals with practical matters, namely management.

Now, it is our point that the positive use of 'efficient' in engineering has been carried over to the management discourse, and that it may also have a double use: both as practical and aesthetic value.

Efficiency and Human Action

In the world of human action, to carry out an activity efficiently means to do it with the minimum amount of effort. Fredrick W. Taylor knew a lot about this and, indeed, one of his goals with the Scientific Management method was to help workers make the most of their time and earn as much as possible. His goal was not to transform humans into machines but to increase their efficiency. In order to do that, he devised advanced times and spaces. Why would advanced timing and spacing yield increased efficiency (which they did)? Well, obviously, they carried with them a tighter control of the worker's day, making it more difficult for them to slack around. Also, the detailed study of the assignments meant the possibility to perfect tools and schedules. It also meant that results could be measured and compared and that they could be optimised.

Taylor wrote about his ideas almost a century ago but, even if most of his management recommendations have been put under serious criticism, some of his assumptions still seem to be valid today. Particularly that which compares an organisation with a machine. Morgan writes about the mechanistic metaphor and also presents some of the critiques that have been directed towards it. We claim that there is something to be learned from engineering practices in order to better understand management: Are we saying that management is engineering? Are we going back to Taylor after all these years?

Well, we would definitely admit that today there is little place for the strictest of bureaucratic forms but one should not confuse the normative recommendations one makes based on the assumption that organisations are like machines and the assumption itself. Many of the original directives made in the name of Scientific Management have been discarded, but has the machine-assumption been forgotten?

In order to answer this question we would like to bring up two ideas. Firstly, an organisation, the very name implies it and it does sound like a tautology, is organised. What we understand with the verb 'to organise' comprises, amongst other things, the design of times and spaces. This design-aspect of organisations relates management to engineering. Secondly, an organisation has a strong instrumental aspect, it is a tool to achieve something. This instrumental-aspect relates organisations to machines.

Management as Engineering of Spaces and Times

In order to design an artefact, one has to know a few things about it. What is this engine supposed to do? Under which conditions? For how long? How much can it cost? All these are engineering matters and are generally summed up in specifications. The engineer is responsible for seeing that the design meets them. Very much the same happens for an organisation: In what niche are we going to position ourselves? Who are our competitors? What sort of employees do we need? How much money do we have?

There are lots of variables that have to be taken into account and often it is not clear neither a) how to measure them nor b) how they are related to each other. Nevertheless, even if it is impossible to know what will happen and how everything is related, something has to be done to get started, and the first thing to do is to simplify: 'Yes, all right, we don't really know exactly what we want and why, but we must get going'. The first simplifications (or abstractions) are made (forget about this, never mind that) in order to obtain a more or less stable ground from which to start. These initial simplifications are central to the idea of a design: A design is a model, an image, with circles and squares and arrows, that describes the state of affairs. It describes a mode of functioning and does so in a mechanical way: it is based on a cause-effect principle and on a flow of events.

A design viewed from this perspective is the result of simplifications. But a design is also an instrument of timing and spacing. With it we mark borders and create a structure. An entity has been created, an immaterial entity that is, indeed, just lines in time and space. Claes Gustafsson calls our attention upon the importance of boundaries in his article *Idiergi*, parting from the simple fact that without them, there is nothing. Idiergi (idiergy, maybe in its English translation?) is the opposite to synergy: as much as synergy is about the strength that obtains from getting together, idiergy is about the movement that obtains from setting up boundaries. So the very first of organising is about the manipulation and maintenance of times and spaces.

This first image of the organisation is important and not easy to achieve. Before it, there is nothing, a bit like the primordial soup: lots of possibilities, chain reactions and whatnots, but no life. Ester Barinaga describes in her thesis how a group of researchers brought together in order to discuss the possibility of a joint research

project (the primordial soup of an organisation) passes from a state of "total vagueness", in which no action can take place, to a state of, what should we call it, pivotal image, in which a point of reference has been found (in her case, it is an image with three interconnected circles). From frustrating never-ending discussions about what it is that they are supposed to be doing, they pass to a play of optimising responsibilities, times and spaces: 'Helena, a good organiser, is going to do that and that; Marcus, who knows a lot about that, will take care of this matter...'.

The design of an organisation includes elements not present in technical engineering, such as responsibility, obedience, trust and other problematic issues. Nevertheless, the basic idea of both designs is the same: to describe the structure and the chain of events that will make the artefact work.

Organisations as Instruments

The word 'machine' has rather negative connotations in the management discourse for all its implication in the objectifying of workers. But the fact is that organisation have something in common with machines which is essential: they are not founded for the pleasure of founding them. They have no value in themselves, their raison d'être lies outside them, in other words, they exist because someone hopes to be able to do something with them. From this perspective, they are tools, exactly in the same way as machines are tools. Companies can be tools to reach a certain niche, or to expand internationally, or to minimise risks, or to produce computers, or to compete in other arenas, etc. Ultimately, the final goal can be expressed, more often than not, as 'making profit'.

> E-commerce offers the speed and efficiency for companies to communicate with their business partners and boost profits. (American Metal Market, **Marketing, e-commerce 'connectivity' to be sought.** Author/s: Thomas P. Conley Issue: June 6, 2001)

If the companies are considered to be profit-making machines, it is not difficult to understand that they should be efficient. This is the same kind of rational explanation that is used in engineering and, very much like in that case, it is probably impossible to once and for all define and measure efficiency. There is one way, though, and that is by means of a gross simplification: the input can be measured as the costs (or the revenue) and the output as profit. By dividing them we get some sort of margin measure which can tell us how efficient the profit-making machine is. With such a definition of 'efficiency' it is not strange that the concept of costs, savings and efficiency are often associated.

> Once the manufacturers have tidied up among their activities the telecom operators will have to go through the same process. The same trend of cost efficiency seeking and trimming of the activities will come to the operators. Most of the operators are not specially efficient today, says Nordström [telecom consult Northstreams, CEO Bengt Nordström]. (Christina Lindqvist, Finanstidningen, 24.08.2001)

This way of measuring the efficiency of an organisation might be easy to implement but it does not help the organisers since it does not take into account what the

organisation looks like at all. It might show that one organisation has achieved a higher margin than another, but it does not explain how. Based on such a limited view of things as the equation provides, the only possible measure to increase efficiency is to reduce costs, which is mathematically evident but hard to translate into times and spaces.

Despite the obvious difficulty in pointing at the causes of inefficiency, which is of the same nature as that which the engineers have to deal with, managers still seek efficiency in their organisations. As in the case of engineers, and allowing for metaphorical expressions, it would seem that they have come under the spell of 'efficiency'. No-one knows how to objectively measure it or what concrete actions lead to it but they all know what it means and they all seek it.

> Our software allows Councils to increase the efficiency of their operation and the public benefit from a more efficient and customer focused service. (Garth Selvey, Comino's Chief Executive. 28 August 2001, www.FT.com)

The Fascination

We have seen that management can be seen as the engineering of time and space and also that the designs that result from this sort of engineering must include elements not present in technical engineering, like responsibility, trust, obedience and so on. It appears self-evident that if it is impossible to describe a universal method of measuring the efficiency of purely technical designs, it will not be any more feasible in the case of organisational designs. Still:

> The group said it was now concentrating on reducing costs and examining ways of improving the efficiency and effectiveness of its business and head office structure. (Lisa Urquhart, www.ft.com. Published: September 7 2001)

The question of the efficiency of an organisation lies then in some sort of tip-of-the-fingers feeling that managers have. Something related to Tacit Knowledge, something that is not within the realm of rationality.

Why has it then become such a powerful concept then? Well, this would need some sort of Foucauldian archaeology: a careful study of the history of the idea of efficiency, together with the changes in discourse, in context and in the signification of other related concepts. It is not our intention to do this here.

We have proposed that this fascination that 'efficiency' exerts in the ranks of management might have to do with the fact that the very same concept is one of the aesthetic values in engineering. In the same way as social sciences have sought to compare themselves with and approach the more successful (in terms of creating valid models of prediction) natural sciences, management might have sought to approach the practically successful engineering. It might also be so that managers have more and more been educated in technical issues, or with a more technical approach to their own issues; or even that more and more engineers (people with a degree in engineering) actually hold managerial posts.

Whatever the reason, we believe that the comparison between the use of the concept of 'efficiency' in both the technical and the managerial discourses opens interesting possibilities, as we have tried to show.

> Big Blue believes the single best way to save money in today's manufacturing operations is not by cutting people and curtailing plant operations, but by enabling both staff and plant to operate more efficiently. The most efficient means to achieve this, IBM executives say, is through software, automation, and the Internet. (Doug Bartholomew; Can IT weather the storm? www.IndustryWeek.com; 19.03.2001)

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Pink Machine is the name of a research project currently carried out at the Department of Industrial Economics and Management at the Royal Institute of Technology, Stockholm. It aims to study the often forgotten non-serious driving forces of technical and economical development. We live indeed in the reality of the artificial, one in which technology has created, constructed and reshaped almost everything that surrounds us. If we look around us in the modern world, we see that it consists of things, of artefacts. Even the immaterial is formed and created by technology - driven by the imperative of the economic rationale.

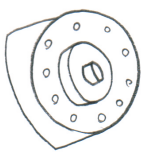
As Lev Vygotsky and Susanne Langer have pointed out, all things around us, all these technological wonders, have their first origin in someone's fantasies, dreams, hallucinations and visions. These things, which through their demand govern local and global economical processes, have little to do with what we usually regard as "basic human needs". It is rather so, it could be argued, that the economy at large is governed by human's unbounded thirst for jewellery, toys and entertainment. For some reason - the inherent urge of science for being taken seriously, maybe - these aspects have been recognised only in a very limited way within technological and economical research.

The seriousness of science is grey, Goethe said, whereas the colour of life glows green. We want to bring forward yet another colour, that of frivolity, and it is pink.

The Pink Machine Papers is our attempt to widen the perspective a bit, to give science a streak of pink. We would like to create a forum for half-finished scientific reports, of philosophical guesses and drafts. We want thus to conduct a dialogue which is based on current research and which gives us the opportunity to present our scientific ideas before we develop them into concluding and rigid - grey - reports and theses.

Finally: the name "Pink Machine" comes from an interview carried out in connection with heavy industrial constructions, where the buyer of a diesel power plant worth several hundred million dollars confessed that he would have preferred his machines to be pink.

Claes Gustafsson



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